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Canadian Stock Assessment Proceedings Series 99/13

Évaluation des stocks canadiens Séries des comptes rendus 99/13

Proceedings of the Transboundary Resources Assessment Committee

20-22 April 1999

Biological Station St. Andrews, New Brunswick

R.N. O'Boyle, Chairman

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August 1999

Canada

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TABLE OF CONTENTS

Abstract/Résumé 4

Introduction 5

5Zjm Cod 6

5Zjm Haddock 9

5Zjmnh Yellowtail Flounder 12

Georges Bank Longline Survey 14

Appendix 1. List of Participants 15

Appendix 2. Invitation Letter 16

Appendix 3. Meeting Schedule 19

Appendix 4. Meeting Remits 20

Appendix 5. List of Documents Tables 21

Appendix 6. List of Recommendations 22

Appendix 7. Proceedings of 25 March 1999 Consultations on Georges Bank Groundfish 23

ABSTRACT

The second Transboundary Resources Assessment Committee (TRAC) meeting was held in St. Andrew's, N.B. during 20-22 April 1999 and provided a forum for the joint Canada/US peer review of the status of the Georges Bank cod, haddock and yellowtail resources. These discussions produced Stock Status Reports to be considered for the 1999 Canadian management plan. A number of recommendations were made to improve the assessments.

RÉSUMÉ

La deuxième réunion du Transboundary Resources Assessment Committee (TRAC) a eu lieu à St. Andrew's (N.-B.) du 20 au 22 avril 1999. Elle a servi de forum pour l'examen commun par les pairs canadiens et américains de l'état des stocks de morue, d'aiglefin et de limande à queue jaune du banc Georges. Dans le cas du Canada, elle a abouti à des Rapports sur l'état des stocks, qui serviront à l'établissement du plan de gestion de 1999. Diverses recommandations visant à améliorer à la fois les évaluations et leur processus ont été formulées.

INTRODUCTION

The chair, R. O'Boyle, opened the meeting by greeting the participants (Appendix 1) and inviting them to introduce themselves.

He then briefly noted that this is the second Transboundary Resources Assessment Committee (TRAC) meeting, the first one being in April 1998. He noted that a description of the TRAC process is in the proceedings of the April 1998 meeting and he wouldn't describe it here. The 1998 meeting was an extensive review of the Canadian and US cod, haddock and yellowtail management units. The focus of this meeting, as will be seen below, is only the Canadian management units, with the US reviews planned for TRAC in fall 1999. Given the extent of the 1998 review, the assessments for this meeting are updates of last year's assessments. Consequently, the level of review does not need to be as extensive.

The products of this meeting are Stock Status Reports to be presented to the Fisheries Resources Conservation Council (FRCC) in Yarmouth (11 May 1999) and Halifax (13-14 May 1999).

The meeting letter of invitation is presented in Appendix 2, the meeting schedule in Appendix 3, the meeting remits in Appendix 4, the list of documents tabled in Appendix 5 and the list of recommendations from the meeting in Appendix 6. In addition, the proceedings of a pre-TRAC meeting industry consultation meeting held by St. Andrew's staff is in Appendix 7.

R. O'Boyle outlined how the meeting would be conducted. For the Proceedings, a rapporteur was assigned for each stock. The senior author of each working paper would present the results of the analyses, during which questions of clarification only would be addressed. Following this, the external reviewer assigned to each stock would be asked to provide comment, after which the floor would be opened to general discussion. These reviewers had been sent background material and the 1998 working papers, as available, prior to the meeting.

The external reviewers by stock were:

5Zjm Cod	L. O'Brien
5Zjm Haddock	R. Mayo
5Zjm Yellowtail	R. Stephenson

5Zjm COD

Working Paper: Hunt, J.J., and T.L. Johnston. 1999. Population Status of Eastern Georges Bank Cod (Unit Areas 5Zj,m) for 1978-99. DFO Working Paper 99/30.

Referee: Loretta O'Brien

Rapporteur: Loretta O'Brien

Remit:

- Report on the status of the stocks, updating results for the latest information from the fisheries and research surveys and characterize the uncertainty of estimates.
- For a range of yield quotas in 1999, evaluate the consequences on exploitation rate in 1999 and on spawning stock biomass (or its proxy) in 2000.
- Estimate the risk that the 1999 fishing mortality rate would exceed $F_{0.1}$ and that the spawning stock biomass in 2000 would not achieve a 0% , 10% and 20% increase compared to 1999, for a range of yield quotas in 1999.
- Report on progress against the following research recommendations made at the 1998 TRAC:
  - It was recommended that exploitable biomass by gear type be determined to attempt to reconcile assessment results with industry perceptions of improved abundance in certain size classes (for longline gear).
  - It was recommended that the implications of different partial recruitment patterns in the projections be examined.

The assessment was presented by Joe Hunt. Comments below reflect discussion which followed the presentation.

The Fishery

At the industry consultations, there was consensus that the RV survey was tracking the population as perceived by the industry. This is in contrast to the previous year where there appeared to be large amounts of older fish in the commercial fishery that did not appear in the survey.

There are regulatory discards in the scallop fishery since they are not allowed to land groundfish, however, there is minimal discarding of cod in the otter trawl and longline fleet. This is supported by corroborative length frequencies of sampling at sea by

observers and dockside monitoring. Any potential discarding would have no effect on the present status of the stock.

The gillnet partial recruitment (PR) was dome-shaped, whereas in other cod stocks the PR is flat-topped. It was suggested this difference may be due to the Georges Bank gillnet fishery targeting younger fish.

Historical fishing patterns have shifted since the implementation of Individual Transferable Quotas (ITQs) in 1993. In more recent years, cod has become more of a by-catch fishery due to the larger TAC for haddock relative to cod. Changes in fleet behaviour to adapt to fishery regulations results in a Catch Per Unit Effort (CPUE) that is no longer indicative of abundance and not useable in the assessment.

- It was **recommended** that spatial distributions of effort by gear sector be provided to corroborate shifts in the fishery after 1993 and that the historical perspective be included in the assessment.

Resource Status

Since the previous assessment, there have been otolith exchanges between Canada and the US that have resulted in a decrease in the percent difference in age estimations detected between the respective age readers. The source of the bias has not yet been determined. The necessity for an ageing workshop was reiterated, as recommended at last year's TRAC. It was suggested that only Rearch Vessel (RV) survey samples be used in exchanges due to the concern of possible mixing in the US Georges Bank and the Gulf of Maine commercial samples.

- It was **recommended** that the source of the bias be investigated at the Ageing Workshop to be held in autumn 1999.

Recent US Globec surveys on Georges Bank have obtained very few cod eggs relative to haddock, suggesting that predation is not the cause of the recent poor recruitment. The stock-recruitment relationship suggests low probability of good recruitment from biomasses less than 25,000t and a higher likelihood of obtaining good recruitment at biomasses greater than 25,000t. Although the current age structure has larger fish the biomass is relatively low.

During the TRAC, the production of cod was estimated from the contribution of growth and from the biomass of age 2 recruits. Production has been from the growth of older age classes throughout the time series and yield of age 2-8 has generally be equal to or above the surplus production. In the last 3 years, yield has been slightly lower than surplus production .

- It was **recommended** that the survivorship (R/SSB) be estimated for the time series.

The age 4 F in 1998 looks anomalous, but this is due to the low survey index and the small catch estimate. The RV surveys indicate a decline in the number of older fish, perhaps due to unavailability to the survey gear. The older ages do not decline in the Vitural Population Analysis (VPA) and the discrepancy results in negative residuals. The uncertainty of these estimates requires cautious interpretation of the magnitude of these older fish.

After a revision to the catch at age (CAA) there appeared to be a decline in age 6 weight at age for the last two years, however, the TRAC agreed to use a four year average in the projections.

Outlook

Projections using bootstrap bias adjusted point estimates of population numbers resulted in similar results to the analytical bias adjusted estimates. The partial recruitment (PR) used in the projection indicated a shift for age 3 fish from 0.7 in 1997 to 0.5 in 1999. The 1997 estimate was calculated using the time series average. The 1998 estimate was derived using the average of the last four years to reflect the current changes in the fishery. A preliminary Yield Per Recruit (YPR) analysis indicated that the shift in the PR and the slight change in mean weights in recent years did not influence the estimate of $F_{0.1}$.

- It was **recommended** that the PR be examined temporally, by gear to detect any shifts in the relative contribution by fleet sector.
- It was **recommended** that the YPR analysis be provided for the next full assessment.
- It was **recommended** to explore presenting projection results with the 50th percentile estimate of biomass or F at each quota option.

At the end of deliberations on this stock, the TRAC accepted the analysis as presented.

5Zjm HADDOCK

Working Paper: Gavaris, S., and L. Van Eeckhaute. 1999. Assessment of Haddock on Eastern Georges Bank. DFO Working Paper 99/31.

Referee: Ralph Mayo

Rapporteur: Ralph Mayo

Remit:

- Report on the status of the stocks, updating results for the latest information from the fisheries and research surveys and characterize the uncertainty of estimates.
- For a range of yield quotas in 1999, evaluate the consequences on the exploitation rate in 1999 and on spawning stock biomass (or its proxy) in 2000.
- Estimate the risk that the 1999 fishing mortality rate would exceed $F_{0.1}$ and that the spawning stock biomass in 2000 would not achieve a 0% , 10% and 20% increase compared to 1999, for a range of yield quotas in 1999.
- Report on progress against the following research recommendations made at the 1998 TRAC:
  - It was recommended that alternative models be considered in a venue more appropriate than this meeting as there are others who should provide their expertise.

The assessment was presented by Stratis Gavaris. Comments below reflect discussion which followed the presentation.

The Fishery

The potential impacts of redirection of the fishery from cod to haddock in recent years was discussed. Specifically, questions arose concerning the recent age composition of the catch which reflects higher proportions of older fish compared to the early 1990s. It was noted that the size composition of haddock in each gear type has not changed substantially, although some exceptions have occurred. There was an increase in catch rates in late 1998 which may reflect the seasonality of the fishery. Furthermore, the fixed gear fishery targeted age 6 haddock (1992 year-class) in deeper water during 1998.

Indications of whether sampling activity has been affected by the change in directivity were not evident for haddock, although the lack of directed cod trips may have resulted in more cod being sampled on haddock directed trips compared to the past. In any event,

sampling in the ports has been augmented by observer samples in recent years, and these activities have remained consistent over time.

Several questions focused on increases in haddock catches from areas where they had not previously been seen, as an indicator of range expansion. Some haddock were observed in catches from the area where the yellowtail fishery occurs, but this was not widespread. Also, the increase in the 1998 USA haddock catch from that portion of 5Zjm was likely a result of the increased trip limits which went into effect in September, 1998, and do not necessarily reflect increased availability. It was concluded that there is no evidence as yet of an increase in the range occupied by haddock within 5Zjm. It has not been established that there was a decrease in the range occupied by haddock within 5Zjm.

There was a change in the 1998 length composition, which reflected higher proportions of smaller haddock in the otter trawl fishery vs. the longline fishery. This may be related to a seasonal shift in the fishery towards the 4th quarter of 1998 allowing for more age 2 fish to be selected by the trawl gear.

Resource Status

The methods used to distinguish between recruitment and growth contributions to the productivity of the stock required further explanation. These measures were derived directly from the biomass at age calculations as estimated from the stock size matrix from the VPA, either by tabulating the contributions from incoming recruitment, or by accumulating the biomass gains contributed by existing year-classes already in the population. The term 'surplus production' was considered to be easily confused with production model results, and it was agreed that another term such as 'conserved biomass' should be used to represent the amount of biomass over that which was harvested.

The expected contribution of the incoming 1996 year-class was discussed. It was noted that these fish should reach about 50 cm by the opening of the fishery in 1999 and that they may be expected to account for about 20% of the catch by weight. With the entry of the 1996 year-class, there should be a broad representation of several year-classes in the fishery.

An inconsistency between the population mean weights at age and the fishery mean weights at age was discussed. It was noted that, in some cases, the mean weight at age in the catch was larger than the population mean weight at age at the beginning of the following year for the same cohort. This was attributed to the different methods used to derive the two sets of mean weights at age. It was agreed that the methods should be consistent and the TRAC recommended that the use of length-weight equations based on eviscerated weight should be investigated for converting fishery length compositions to weights before converting to live weight equivalents in the calculation of mean weights at age.

The VPA model assumptions applied to the 1999 assessment were questioned, and it was noted that the same formulation and assumptions were employed in 1999 as in the previous VPA calibration, except for the treatment of zero catches at age in the terminal year.

Outlook

The estimated size of the 1998 year-class at age 1 in 1999 was beyond the range of previous observations used in the regressions derived from the DFO spring survey from 1986-1999, but was within the range of observations included in the USA autumn regressions. Although a single observation from the 1999 spring DFO survey contributed substantially to the high index for this year-class, it was noted that relatively high numbers of age 1 haddock were observed at several locations in 1999.

It was noted that the estimate of the absolute size of this year-class is imprecise compared to stock size estimates for ages 2 and older, but the TRAC concluded that the 1998 year-class is at least as large as any observed in the past 20 years, and may approach the size of the 1975 and 1978 year-classes. Another year of data is required before a more refined estimate can be derived. However, the uncertainty about the estimated size of the 1998 year-class does not impact the 1999 catch forecasts. Although there appeared to be a slight retrospective trend in the estimation of age 1 stock size for a few year-classes, no consistent overall pattern could be detected.

Although difficult to predict beyond 2000, it was estimated that the age 3-8 stock biomass would increase considerably in the near term if the 1998 year-class is at least as strong as the 1992 year-class; if the 1998 year-class is as large as initially estimated, the age 3-8 biomass may approach 40,000 t in 3-4 years.

The derivation of the 40,000 t biomass threshold and its applicability at the current level of stock productivity as indicated in the stock-recruitment plot was discussed at length. Additional insight on the stock-recruitment relationship could be gained by examining recruit/stock biomass (R/S) ratios as an indicator of early survival. Two specific questions were asked:

1) Is there a reasonable expectation that recruitment levels observed at biomasses above 40,000 t can be achieved under the present productivity regime, given that these higher levels of recruitment occurred almost exclusively during an earlier period?

2) Is there evidence to suggest a productivity regime shift on Georges Bank?

In response to these questions the TRAC concluded that, in contrast to the cod stock, there is now sufficient evidence to suggest that the age structure of the haddock stock has expanded due to both increased survival of existing year-classes and generally improved recruitment since 1995. However, considerable caution must be exercised when extrapolating beyond the present set of recent observations. Nevertheless, the TRAC

agreed that a biomass of 40,000 t or greater can be achieved in the foreseeable future if survival remains relatively high and recent levels of recruitment are maintained.

Noting the above, the TRAC accepted the assessment as presented.

5Zjmnh YELLOWTAIL FLOUNDER

Working Paper: Neilson, J., S. Gavaris, and P. Perley. 1999. 1999 Update of Stock Status of Georges Bank (5Zjmnh) Yellowtail Flounder. DFO Working Paper 99/32

Referee: Rob Stephenson

Rapporteur: R. Stephenson

Remit:

- Report on the status of the stocks, updating results for the latest information from the fisheries and research surveys and characterize the uncertainty of estimates.
- For a range of yield quotas in 1999, evaluate the consequences on exploitation rate in 1999 and on spawning stock biomass (or its proxy) in 2000.
- Estimate the risk that the 1999 fishing mortality rate would exceed $F_{0.1}$ and that the spawning stock biomass in 2000 would not achieve a 0% , 10% and 20% increase compared to 1999, for a range of yield quotas in 1999.
- Report on progress against the following research recommendations made at the 1998 TRAC:
  - It was recommended that Canadian ageing program for yellowtail be developed. Also, research is required on the use of otoliths as an ageing structure.
  - It was recommended that the implications of doing sex-aggregated vs. sex-separated SPAs be investigated with simulation. Consideration should be given to the precision of stock size estimates, possible confounding of population wide and sex-specific partial recruitment and weights at age, and the costs associated with doing essentially two SPAs.

The assessment was presented by John Neilson. Major items raised in the discussion follow.

Input data had been presented earlier at an industry consultation meeting in Yarmouth, and there was concurrence on these data and on the general view of the stock.

Autumn catches often include a high proportion of females and an industry member asked if this would be a problem when fishing at $F_{0.1}$? It was explained that this would probably not cause a problem, but that projections could be done to show the change in spawning potential under various sex ratios experienced in the fishery.

Discarding is not considered to be a major problem in this fishery. There are anecdotal accounts that the scallop fleet has stopped targeting yellowtail, but the recent changes in yellowtail distribution would make them more available to scallop fishing. It was recommended that the bycatch of yellowtail in the scallop fishery be investigated.

Sampling remains below what would be desirable, but was considered appropriate for this assessment. It was noted that the 1998 USA quarter 4 sampling data were not available, there were no age determination for Canadian samples, and there had been reduced ageing for US samples.

There was considerable discussion regarding the commercial CPUE series. While the apparent increase in yellowtail abundance over the time series is consistent with other indications (RV survey data, and industry observation), there were also changes in gear and learning during the first 2-3 years of the survey series (1993-1995) which complicate use of this series as an index.

RV surveys contain relatively low numbers of yellowtail (especially NMFS surveys) and exhibit a strong year effect. It is quite clear that the areas of concentration of yellowtail are quite localized and that those areas are poorly represented in survey sampling stations in some years. On the other hand, the surveys show the same trend, and are considered to reflect the pattern of abundance.

Yellowtail distribution: The directed fishery for yellowtail was even more aggregated in 1998 than in previous years, however yellowtail was taken as bycatch over a wider area than in recent years. It was subsequently determined that the apparent increase in records of yellowtail catch in 5Zj in 1998 was an artifact of including catches less than 0.5t. These records were excluded in previous years.

The analytical models used in this assessment were similar in structure to those used in 1998, and gave similar results to last year. The change to use of 5+ rather than 6+ (to avoid 0's in 6+) did not significantly affect the assessment results.

The index at age 2 shows a recent pattern of negative residuals which should be investigated (perhaps in relation to discards).

Both Canada and USA have made allocations assuming a catch by the other nation, which may not be realistic. Consistency in management between the two countries should be pursued.

Divergence in the projection between the ASPIC and VPA models is largely due to the assumed recruitment. ASPIC assumes that the good recruitment in the recent year will continue, whereas the VPA uses a recent average. The latter scenario is considered more likely, so the VPA output was preferred.

The assumed strength of the 1997 year-class is important to the prognosis for this stock, as it is projected to account for a large proportion of the biomass.

GEORGES BANK LONGLINE SURVEY

Working Paper: Johnston, T.L, and J.J. Hunt. 1999. Preliminary Results of a Longline Survey in Georges Bank. DFO Working Paper 99/33

Referee: Joe Hunt

Rapporteur: Joe Hunt

Preliminary results and analysis of a Georges Bank longline survey were presented by Terry Johnston.

Most discussion focused on the experiment design and the need to follow sampling and fishing protocols. In particular, it was noted that the annual location of the fishing site varied substantially from the designated site in each of the three years. This variation was attributed to both lack of understanding of the objectives and to inherent problems in controlling the setting, drift and location of longline gear. Other problems included variation from the 1,500 hooks to be set in each of the designated locations and the potential for bias. Bias might develop if funding is based on catches or attempts to vary fishing location in order to maximise perceived annual changes in areas of abundance.

Overall, the established protocols appeared to address the issues of design control and problems arose when deviation from protocol occurred.

Initial comparison of year-class abundance at age in the survey with assessment results showed good correspondence in relative strength and trends.

The potential of the survey as an index of abundance was recognised but additional requirements to deal with other factors such as lack of coverage in the USA zone, unsampled areas in the Canadian zone and limits of stock distribution will need to be addressed.

Appendix 1: List of Participants

Canada/US Transboundary Resources Assessment Committee (TRAC)
20-22 April 1999, St. Andrews, New Brunswick

List of Participants

Participant	Affiliation/Address	Telephone	Fax	E-Mail
Bob O'Boyle	DFO, Dartmouth, Canada	902-426-3526	902-426-5435	oboyler@mar.dfo-mpo.gc.ca
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Jean Guy d'Entremont	FRCC, Canada	902-762-2522	902-762-3464	jean.guy@ns.sympatico.ca
Claude d'Entremont	Inshore Fisheries Ltd., Canada	902-762-2522	902-762-3464	inshore@auracom.com
John Neilson	DFO, St. Andrews, Canada	506-529-5913	506-529-5867	neilsonj@mar.dfo-mpo.gc.ca
Jorgen Hansen	DFO, Halifax, Canada	902-426-9046	902-426-9683	hansenj@ mar.dfo-mpo.gc.ca
Julie Porter	DFO, St. Andrews, Canada	506-529-5902	506-529-5862	porterj@ mar.dfo-mpo.gc.cu
Loretta O'Brien	NMFS, Woods Hole, USA	508-495-2273	508-495-2393	loretta.o'brien@noaa.gov
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Ralph Mayo	NMFS, Woods Hole, USA	508-495-2310	508-495-2393	ralph.mayo@noaa.gov
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Joe Hunt	DFO, St. Andrews, Canada	506-529-5893	506-529-5862	huntj@mar.dfo-mpo.gc.ca
Terry Johnston	DFO, St. Andrews, Canada	506-529-5927	506-529-5862	johnstont@mar.dfo-mpo.gc.ca
Dan Lane	University of Ottawa / FRCC, Canada	613-562-5800	613-562-5166	dlane@uottawa.ca
Stacey Paul	DFO, St. Andrews, Canada	506-529-5874	506-529-5862	pauls@mar.dfo-mpo.gc.ca
Cecil Nelson	DFO, St. Andrews, Canada	506-529-8854	506-529-5862	nelsonc@mar.dfo-mpo.gc.ca
Nicole Seamone	DFO, St. Andrews, Canada	506-529-8854	506-529-5862	seamonen@mar.dfo-mpo.gc.ca
Peter Perley	DFO, St. Andrews, Canada	506-529-5928	506-529-5862	perleyp@mar.dfo-mpo.gc.ca

Appendix 2: Invitation Letter

Office of the Regional Advisory Process
Bedford Institute of Oceanography
P.O. Box 1006
Dartmouth, Nova Scotia
Canada B2Y 4A2
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Fax: 1-902-426-5435
e-mail: oboyler@mar.dfo-mpo.gc.ca

11 March 1999

Subject: **April 1999 Transboundary Resources Assessment Committee Meeting**

You are cordially invited to attend the Spring 1999 meeting of the Transboundary Resources Assessment Committee (TRAC), to be held in St. Andrew's, New Brunswick, Canada, during 20-22 April 1999.

The TRAC was established in 1998 to peer review assessments of stocks tranboundary to the Canada/US boundary on the east coast. The purpose of this meeting is to review the status of the following stocks:

- Eastern Georges Bank cod (5Zjm)
- Eastern Georges Bank haddock (5Zjm)
- Georges Bank yellowtail flounder (5Z)

The remit, or terms of reference, for each stock is attached as are also the detailed schedule of the meeting and list of invitees.

This year, the meeting will be held at the Conference Centre at the St. Andrew's Biological Station. If you need directions see the commissionaire at the front door of the Station.

I would like to start the meeting promptly at 08:30 on Tuesday, April 20th, so plan accordingly.

In regards to accommodations, this year I have not arranged for any block bookings. However, I suggest that you contact the hotel of your choice and reserve early.

If you have any questions on any aspect of the meeting, please feel free to contact me at the address in the letterhead.

I look forward to seeing in St. Andrew's.

Sincerely,

Robert N. O'Boyle

Attachments (3)

cc: M. Sinclair
C. Annand
D. Geddes
V. Myra

Transboundary Resources Assessment Committee (TRAC)
20-22 April 1999

Invitees

Chairperson(s)

R. O'Boyle (Canada)
S. Clark (USA) (unable to attend)

DFO (Canada)

M. Sinclair (DFO, Bedford Institute of Oceanography)
P. Fanning (DFO, Bedford Institute of Oceanography
J. Neilson (DFO, St. Andrew's Biological Station)
J. Hunt (DFO, St. Andrew's Biological Station)
M. Buzeta (DFO, St. Andrew's Biological Station)
L. VanEeckhaute (DFO, St. Andrew's Biological Station)
S. Gavaris (DFO, St. Andrew's Biological Station)
P. Perley (DFO, St. Andrew's Biological Station)
R. Stephenson (DFO, St. Andrew's Biological Station)
J. Hansen (DFO, Maritime Centre)
C. Annand (DFO, Maritime Centre)

NMFS (USA)

R. Mayo (National Marine Fisheries Service)
L. O'Brien (National Marine Fisheries Service)

Industry

E. Walters
B. Giroux
M. O'Connor
C. d'Entremont
T. Nickerson

FRCC

M. Yeadon
J.-D. d'Entremont
F. Woodman

Appendix 3. Meeting Schedule

Transboundary Resources Assessment Committee (TRAC)
Conference Centre, Biological Station
St. Andrew's, New Brunswick, Canada

20-22 April 1999

Time	April 20th Tuesday	April 21st Wednesday	April 22nd Thursday
08:30 – 09:00	Introduction	Yellowtail 5Z	Reanalyses & Report Review
09:00 – 09:30	Cod 5Z	Yellowtail 5Z	Reanalyses & Report Review
09:30 – 10:00	Cod 5Z	Yellowtail 5Z	Reanalyses & Report Review
10:00 – 10:30	Cod 5Z	Yellowtail 5Z	Reanalyses & Report Review
10:30 – 11:00	Cod 5Z	Yellowtail 5Z	Reanalyses & Report Review
11:00 – 11:30	Cod 5Z	Yellowtail 5Z	Reanalyses & Report Review
11:30 – 12:00	Cod 5Z	Yellowtail 5Z	Reanalyses & Report Review
12:00 – 12:30	Cod 5Z	Yellowtail 5Z	Reanalyses & Report Review
12:30 – 13:30	Lunch	Lunch	Lunch
13:30 – 14:00	Haddock 5Zjm	Reanalyses & Report Review	Reanalyses & Report Review
14:00 – 14:30	Haddock 5Zjm	Reanalyses & Report Review	Reanalyses & Report Review
14;30 – 15:00	Haddock 5Zjm	Reanalyses & Report Review	Reanalyses & Report Review
15:00 – 15:30	Haddock 5Zjm	Reanalyses & Report Review	Reanalyses & Report Review
15:30 – 16:00	Haddock 5Zjm	Reanalyses & Report Review	Reanalyses & Report Review
16:00 – 16:30	Haddock 5Zjm	Reanalyses & Report Review	Reanalyses & Report Review
16:30 – 17:00	Haddock 5Zjm	Reanalyses & Report Review	Reanalyses & Report Review

Appendix 4. Meeting Remits

For the following resources:

Eastern Georges Bank cod (5Zjm)
Eastern Georges Bank haddock (5Zjm)
Georges Bank yellowtail flounder (5Zjmnh)

- Report on the status of the stocks, updating results for the latest information from the fisheries and research surveys and characterize the uncertainty of estimates.

- For a range of yield quotas in 1999, evaluate the consequences on exploitation rate in 1999 and on spawning stock biomass (or its proxy) in 2000.

- Estimate the risk that the 1999 fishing mortality rate would exceed F0.1 and that the spawning stock biomass in 2000 would not achieve a 0% , 10% and 20% increase compared to 1999, for a range of yield quotas in 1999.

- Report on progress against the following research recommendations made at the 1998 TRAC:

Eastern Georges Bank cod

- It was recommended that exploitable biomass by gear type be determined to attempt to reconcile assessment results with industry perceptions of improved abundance in certain size classes (for longline gear).

- It was recommended that the implications of different partial recruitment patterns in the projections be examined.

Eastern Georges Bank haddock

- It was recommended that alternative models be considered in a venue more appropriate than this meeting as there are others who should provide their expertise.

Georges Bank yellowtail flounder

- It was recommended that Canadian ageing program for yellowtail be developed. Also, research is required on the use of otoliths as an ageing structure.

- It was recommended that the implications of doing sex-aggregated vs. sex-separated SPAs be investigated with simulation. Consideration should be given to the precision of stock size estimates, possible confounding of population wide and sex-specific partial recruitment and weights at age, and the costs associated with doing essentially two SPAs.

Appendix 5. List of Documents Tabled

Gavaris, S., and L. Van Eeckhaute. 1999. Assessment of Haddock on Eastern Georges Bank. DFO Working Paper 99/31.

Hunt, J.J., and T.L. Johnston. 1999. Population Status of Eastern Georges Bank Cod (Unit Areas 5Zj,m) for 1978-99. DFO Working Paper 99/30.

Johnston, T.L., and J.J. Hunt. 1999. Preliminary Results of a Longline Survey in Georges Bank. DFO Working Paper 99/33.

Neilson, J., S. Gavaris, and P. Perley. 1999. 1999 Update of Stock Status of Georges Bank (5Zjmnh) Yellowtail Flounder. DFO Working Paper 99/32.

Appendix 6. List of Recommendations

5Zjm Cod

- It was **recommended** that spatial distributions of effort by gear sector be provided to corroborate shifts in the fishery after 1993 and that the historical perspective be included in the assessment.
- It was **recommended** that the source of the bias be investigated at the Ageing Workshop to be held in autumn 1999.
- It was **recommended** that the survivorship (R/SSB) be estimated for the time series.
- It was **recommended** that the PR be examined temporally, by gear to detect any shifts in the relative contribution by fleet sector.
- It was **recommended** that the YPR analysis be provided for the next benchmark assessment.
- It was **recommended** to explore presenting projection results with the 50th percentile estimate of biomass or F at each quota option.

Appendix 7. Proceedings of March 25, 1999 Consultations on Georges Bank Groundfish

Rapporteur: Stratis Gavaris

Fishermen, industry representatives, other stakeholders and DFO staff met in Yarmouth on March 25, 1999 to review information available for stock status evaluation (listed below). John Neilson welcomed participants, indicated that we would be considering the transboundary Georges Bank groundfish resources for cod, haddock and yellowtail. He indicated that this meeting was the first in the schedule of events leading to fisheries management advice for 1999. The technical review of the stock status evaluations is scheduled for April 20-22 in St. Andrews. DFO staff plan to convene consultations at Yarmouth in early May to review the results of the stock status evaluations. The FRCC will undertake public consultations shortly thereafter.

DFO staff summarized annual trends, seasonal and spatial patterns for commercial catches, size and age composition of catches, effort and catch rates in the commercial fishery, spatial distribution patterns from surveys and abundance and recruitment trends derived from surveys. These presentations served as a background to promote discussion and elicit views on fishermen's perceptions from their experiences. This report documents the main points of discussion.

Haddock

Presenter: Lou Van Eeckhaute

- Are catches properly attributed to vessel size which caught the fish for the Temporary Vessel Replacement Program TVRP?
  - Data extracted from the fishery statistics database should reflect the vessel doing the fishing while quota reports should attribute catches against the sector allocated the quota. **Action**: This should be confirmed.
- Why are surveys adjusted for catchability?
  - Surveys are used to explore relative trends in abundance. We are fortunate to have 3 surveys but they are conducted during different seasons and with different vessels/gear. In order to make these results comparable across surveys we use results from past assessments on the relative catching efficiency of these surveys.
- Is there evidence for expansion of the area occupied as the abundance has increased?
  - The survey distribution results suggest that the habitat occupied in the past 5-6 years has remained similar but abundance has increased throughout proportionately.
- Weight at age for ages 5-7 from the survey appear to be declining. Is this a concern? Why is there so much variation?
  - The weight at age is within the range of variation observed and we have seen 2-3 year trends in previous periods therefore the current situation may not be unusual. There are a wide range of possibilities for growth dynamics to vary from year-

class to year-class. In addition, some of the fluctuation is caused by random sampling variation. For older fish, the sampling from the commercial fishery might be a less variable source to examine trends. **Action**: Examine weight at age from commercial fishery.

- Why do the NMFS spring and fall surveys show large differences even within the same year?
  - Surveys are typically very variable. The NMFS sampling intensity on eastern Georges Bank is quite low and large random sampling variations may be expected. The assessment process uses all years of observation to establish the relationship between the survey and the population to minimize the impact of any single observation.
- Are the results shown for the 1999 DFO survey based on age interpretation?
  - Yes, the age material for this survey has been processed.

Cod

Presenter: Joe Hunt

- With the concern about poor recruitment, is the increase in survey 3+ biomass for the last year due to body growth?
  - Much of the biomass growth in recent years has been due to body growth. **Action**: Determine the extent to which the incoming 1995 year-class impacted the biomass increase.
- In light of the poor recruitment, we should protect what little is there of the 1995 year-class.
- Comparison of length frequencies from port sampling and observer coverage indicated that smaller fish were present in the observer samples, particularly in June. Did there appear to be high-grading in the port samples?
  - It is difficult to detect high-grading, but the general appearance of the length composition in the port samples did not suggest culling. It was subsequently noted that vessels could only fish the top of the bank (<90 fathoms) if they carried an observer. Trips in deeper water on the Northern Edge and in the Gully would probably not have carried observers. Smaller fish are caught on top of the bank compared to the deeper waters. The differences observed may be due to differences in location and depth of fishing. **Action**: Segregate observer and port samples by depth before comparison.
- Why is cod recruitment poor when haddock, a similar species, is showing improved recruitment?
  - At this time, we can only speculate about the causes of poor recruitment. The facts are that we observed low indices of recruitment for the 1997 and 1998 year-classes.
- Low recruitment does not mean zero?
  - It is not zero, but it is exceptionally low compared to past observations.
- Is lack of predation by cod helping haddock survival and recruitment?

- ➢ Ecosystems are complex and there is no doubt some interaction. It should be noted though that abundance of 0-group haddock in the October survey is correlated with year-class strength, therefore subsequent predation by cod during the benthic phase of the life history may not be that variable.

- ❖ It seems that cod recruitment is underestimated while haddock recruitment is overestimated in many assessments. Could cod recruitment be better?
  - ➢ Retrospective analyses for Georges Bank resources do not show any patterns of bias.
- ❖ The spawning period for cod and haddock are similar. Does this mean that environmental or ecosystem effects cannot be causing the difference in recruitment success?
  - ➢ Cod and haddock have similar habits in the early life stages therefore it does seem improbable that general environmental conditions, prey availability or predation could be the cause of the recruitment success. This does not rule out however, some specific aspect, as yet unidentified, in the environment or ecosystem which might only affect cod survival.
- ❖ Fishermen noted that haddock spawners are found over gravelly bottom while cod spawners tend to be found over harder bottom. Could there be cod spawning habitat loss from destructive fishing practices?
  - ➢ There has not been any fine spatial scale analysis of cod spawning habitat and how it may have changed over the years.
- ❖ Is it possible that cod are chasing "feed" and have moved somewhere else?
  - ➢ NMFS surveys in the spring and fall and DFO surveys in the summer cover the deeper waters and have not detected large abundance of cod. The stock status for the Bay of Fundy, Scotian Shelf and Gulf of Maine show similar low abundance.

Yellowtail

Presenter: John Neilson

- ❖ The steep ascending limb of the length composition for the USA fishery suggests substantial culling?
  - ➢ The estimates of discards for the USA fishery are low and not consistent with extensive culling. The descending limb is also steep. **Action**: Consult NMFS scientists.
- ❖ The length composition of the USA catch shows a higher abundance of smaller fish but the 6" diamond mesh used in the USA fishery should select fewer small flatfish.
  - ➢ This appears inconsistent. **Action**: Examine length composition by sex and consult NMFS scientists.
- ❖ Fishermen noted that the spatial area of the yellowtail aggregations appeared to be smaller in 1998 compared to previous years.
- ❖ The distribution of yellowtail captures shows very widespread by-catch in unit area 5Zjm, unlike previous years. Fishermen noted subsequently that though the trip catch of yellowtail should be accurately reported, the position of capture might not be. It is unlikely that yellowtail was caught at depths greater than 60 fathoms. Yellowtail by-

catch is monitored on a percentage basis. Concern that the percentage does not exceed regulated levels for portions of trips may result in logging the yellowtail by-catch uniformly over the whole trip. **Action**: Examine ZIFF database for yellowtail catches in deeper water and investigate distribution of yellowtail catches among sets in those trips.

Longline Survey

Presenter: Joe Hunt

- Are there spatial trends, i.e. changes in which boxes had high cod catches, are haddock caught in boxes that cover deeper water?
  - These features have not been examined. **Action**: Display catches geographically for the 3 years.
- Is it a problem that many boxes are not surveyed?
  - It was recognized from the outset that only the Canadian side of the management unit could be surveyed. In subsequent consultations, longline fishermen identified other boxes which would be impractical to fish. **Action**: Review the options for dealing with the area that is not covered when developing an index.

Participants

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